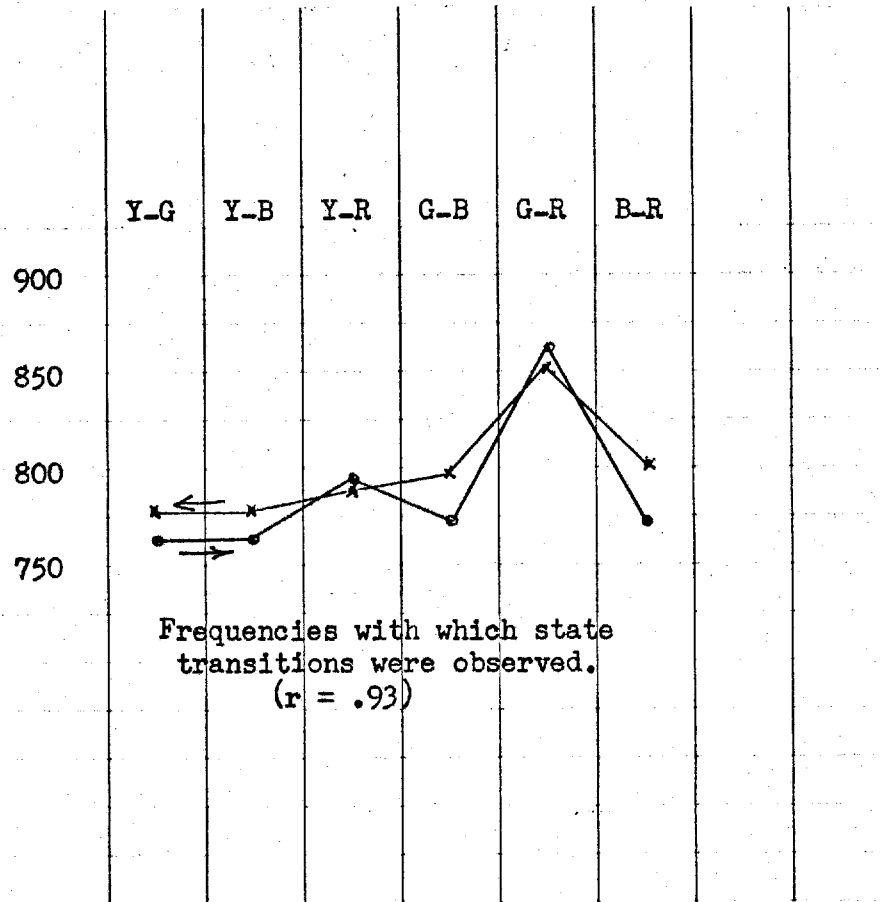


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Attachment to ORD 2240-75



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departure from random expectation during the successful run, and therefore, the significant result cannot be attributed to machine malfunction.

At a later time, subject S2 was asked to repeat the entire experiment, and he was able to replicate successfully a high mean scoring rate (27.88/100 average over 2500 trials, a result whose a priori probability under the null hypothesis is $p = 4.8 \times 10^{-4}$).

We thus conclude from this part of the study that of the six subjects tested, one subject (S2) generated a significant result replicable and not attributable to machine malfunction.

Finally, the study taken as a whole (15,750 trials) was significant, yielding an average scoring rate 26.47 hits/100 trials, a result whose a priori probability under the null hypothesis is $p = 1.1 \times 10^{-5}$.

The bit rate associated with the information channel can be calculated from

$$R = H(x) - H_y(x),$$

where $H(x)$ is the uncertainty of the source message containing symbols with a priori probability P_i

$$H(x) = - \sum_{i=1}^4 P_i \log_2 P_i$$

and $H_y(x)$ is the conditional entropy based on the a posteriori probabilities that a received symbol was actually transmitted

$$H_y(x) = - \sum_{i,j=1}^4 P(i,j) \log_2 P_i(j).$$

For S2's first run, with $P_i = 1/4$, $P(k,k) = 0.2936$, and an average of

30 seconds per choice, we have a source uncertainty $H(x) = 2$ bits and a

calculated bit rate

$$R \approx 0.007 \text{ bits/symbol}$$

or

$$R/T \approx 2 \times 10^{-4} \text{ bits/sec.}$$